Abstract

An apparatus and method for rapid translation of geographic latitude and longitude into any of a number of application-specific location designations or location classifications, including street address, nearest intersection, PSAP (Public Safety Answering Point) zone, telephone rate zone, franchise zone, or other geographic, administrative, governmental or commercial division of territory. The speed of translation meets call-setup requirements for call-processing applications such as PSAP determination, and meets caller response expectations for caller queries such as the location of the nearest commercial establishment of a given type. To complete its translation process in a timely manner, a memory-stored spatial database is used to eliminate mass-storage accesses during operation, a spatial indexing scheme such as an R-tree over the spatial database is used to locate a caller within a specific rectangular area, and an optimized set of point-in-polygon algorithms is used to narrow the caller's location to a specific zone identified in the database. Additional validation processing is supplied to verify intersections or street addresses returned for a given latitude and longitude. Automatic conversion of latitude-longitude into coordinates in different map projection systems is provided.

The memory-stored database is built in a compact and optimized form from a relational spatial database as required. The R-tree spatial indexing of the memory-stored database allows for substantially unlimited scalability of database size without degradation of response time. Maximum performance for database retrievals is assured by isolating the retrieval process from all updating and maintenance processes. Hot update of the in-memory database is provided without degradation of response time.

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52